OUTLINE OF THE PROPOSED RESEARCH WORK FOR THE DEGREE OF

PHILOSOPHY IN PHARMACEUTICAL SCIENCE & TECHNOLOGY

Submitted to

Swami Ramanand Teerth Marathwada University, Nanded

Research Topic

"Pharmacognostical, Phytochemical and Pharmacological Evaluation of Plants of *Sesbania* genus from India"

Submitted by

Mr. Chandrawadan Vishwambhar Panchal

M. Pharm

Research Guide

Dr. Dhanraj R. Jadge

M.Pharm Ph. D.

Professor

Latur College of Pharmacy, Hasegaon, Tq. Ausa, Dist. Latur

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INTRODUCTION

Sesbania genus

Sesbania, Fabaceae family is a large genus of herbs, shrubs and soft-wooded but short-lived trees distributed in the tropical regions of the world. Six species occur in India.

Species present in the genus

- *Sesbania grandiflora*
- *Sesbania sesban*
- *Sesbania cannabina*
- *Sesbania speciosa*
- *Sesbania procumbens*
- *Sesbania roxburghii*

(The Wealth of India, 1972)

LITERATURE REVIEW

Phytochemistry of *Sesbania* genus:

Name of the species	**Plant parts**	**Class of compounds**	**References**
Sesbania grandiflora	Leaves	Protein, calcium, vitamin-A, thiamine, riboflavin, nicotinic acid, vitamin-C, iodine, pectin, saponin, aliphatic alcohol(grandiflorol), arginine, cystine, histidine, isoleucin, leucine, lysine, methionine, phenylalanine, tryptophan, valine, threonine, alanine, asparagine, aspartic acid and glycine.	The Wealth of India, 1972 R.K.Momin, 2012
	Flowers	Thiamine, vitamin C.	
	Seeds	Palmitic acid, stearic acid, oleic acid, linoleic acid and galactomannan.	
Sesbania cannabina	Seeds	Mixture of saponins	The Wealth of India, 1972
		(*Z*)-12-Hydroxyoctadec-9-enoic acid, hydroxyolefinic fatty acid, lauric, myristic, palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, arachidic and behenic acid.	Humaira and Abdul, 2007
	Leaves	Mixture of saponins	The Wealth of India, 1972

Sesbania sesban	Flowers Seeds	Cyanidin and delphinidin glycoside acylated with gallic acid and an unidentified acid and six flavonols. Mixture of saponins, palmitic acid, stearic acid, lignoceric acid, oleic acid, linoleic acid and linolenic acid.	The Wealth of India, 1972 Arif Ahmed, 2013 Acta Botanica Sinica, 2015
Sesbania speciosa	Seeds	Mixture of saponins and oleanolic acid.	The Wealth of India, 1972

Ethnopharmacological Study:

Name of the species	Plant parts	Traditional uses	References
Sesbania grandiflora	Root Leaves Flowers Fruit Bark	Vata, kapha, inflammation, rheumatism, expectorant. Boils, coryza and emaciation Kapha, itching, leprosy, night blindness, epilepsy, gout, tonic, antipyretic, night blindness, nasal catarrh, headache and bruises. Diuretic, laxative, disinfect mouth and throat and in sore throat. Nasal catarrh, nyctalopai and cephalalgia. Vata, quartan fever, night blindness, bronchitis, gout, nasal catarrh, headache, dimness of vision, emollient and laxative. Tridosha, fevers, pains, bronchitis, anaemia and tumors. Tonic, small pox, diarrhoea, dysentery and snake bites.	Kritikar and Basu, 2008 Chetty et al., 2008 Kritikar and Basu, 2008 The Wealth of India, 1972 Prajapati and Kumar, 2003 Kritikar and Basu, 2008 Kritikar and Basu, 2008

	Seeds	Malaria, scabies, ulceration of tongue, thrush, infantile disorders of the stomach. Astringent, cooling, dyspepsia and gastralgia. Antipyretic Emmenagogue.	The Wealth of India, 1972 Prajapati and Kumar, 2003 Chetty et al., 2008
Sesbania cannabina	Root Seeds Leaves	Anthelmintic, diuretic, galactagogue, diseases of the eye and snake bites. Smallpox eruptions, diseases of the spleen, diarrhoea, excessive menstrual flow, itching of the skin. Kapha, itching, leprosy, night blindness, epilepsy, gout, tonic, antipyretic, night blindness, nasal catarrh, headache and bruises.	Kritikar and Basu, 2008
Sesbania sesban	Root Leaves Bark Seeds	Kapha, inflammation, tuberculous glands, fevers, ulcers, diabetes, leucoderma, throat troubles and scorpion stings. Pain, inflammation and anthelmintic. Suppuration of boils and abscesses. Astringent. Itches. Smallpox eruptions, diseases of the spleen, diarrhoea, excessive menstrual flow and stimulant. Smallpox eruptions, diseases of the spleen, diarrhoea, excessive menstrual flow, itching of the skin. Astringent and stimulant.	Kritikar and Basu, 2008 Kritikar and Basu, 2008 The Indian Materia Medica, 2002 Kritikar and Basu, 2008 The Indian Materia Medica, 2002 The Wealth of India, 1972 Kritikar and Basu,

	Flowers	Suppurative. Leucorrhoea, menorrhagia, wounds and ulcers.	200 The Indian Materia Medica, 2002
Sesbania bispinosa	Root Seeds	Anthelmintic, diuretic, galactagogue, diseases of the eye and snake bites. Smallpox eruptions, diseases of the spleen, diarrhoea, excessive menstrual flow, itching of the skin.	The Wealth of India, 1972 Shelly Sharma, 2014
Sesbania roxburghii	Leaves Seeds	Poultices. Stimulant, emmenagogue and astringent.	The Wealth of India, 1972

AIM

- To perform Pharmacognostical evaluation
- To perform extraction and phytochemical screening of various extracts
- Isolation and characterization of compounds
- To perform various Pharmacological activities of extracts

PLAN OF WORK

- **Pharmacognostical studies**
  - Collection and Authentication
  - Macroscopic characters
  - Microscopic characters
  - Ash values
  - Extractive values
- **Phytochemical analysis**
  - Extraction of plant material
  - Phytochemical screening
  - TLC Profile

- Isolation of constituents
- Characterization of isolated compound(s) by different spectroscopic techniques such as UV, FTIR, NMR, MASS etc.
- Pharmacological evaluation with respect to Anti-inflammatory activity of extracts.

PHARMACOLOGICAL EVALUATION

ANTI-INFLAMMATORY ACTIVITY *(Turner, 1965)*:

Both in-vivo and in-vitro methods are available for the evaluation of anti-inflammatory agents but among the *in-vivo* methods the **carrageenan induced rat paw oedema assay** is believed to be one of the most reliable and also the most widely used. Carrageenan is a mixture of polysaccharides composed of sulfated galactose units and is derived from Irish Sea moss, *Chondrous crispus.* Its use as an endemogen was introduced by C.A. Winter *et.al*. in 1932 The oedema, which develops in rat paw after carrageenan injection, is a biphasic event. The initial phase is attributed to the release of histamine and serotonin, the oedema maintained between the 1^{st} and 2^{nd} phase to release of kinin like substances and the 2^{nd} phase to release of prostaglandins like compound.

The carrageenan assay method is advantageous

1. The oedema is specifically inhibited by anti-inflammatory compounds.
2. Single oral dose of drugs at non-toxic levels are effective.
3. Low variability.
4. Better reproducibility.
5. Carrageenan itself is neither antigenic nor causes any systemic effects.

PAW VOLUME MEASUREMENT

The instrument used for rat paw volume measurement was digital Plethysmometer (UGO BASTILE). The instrument (fig. 1) consists of two transparent interconnected cells. One of the cells within it is connected by two electrodes, which are connected to the reading device. The cell is marked at the upper end, which is used for dipping the rat paw. The reading device

gives electronic display by which the volume of rat paw can read. A paddle switch is provided with the instrument to avoid fluctuations due to personal error of dipping the rat's paw to get the constant reading. A reservoir containing the displacement fluid is connected to the interconnected cell and kept at slightly higher level. The displacement fluid is solution of sodium chloride (40-50 % w/v) containing 4 to 5 ml of wetting agent. The addition of wetting agent helps to minimize the formation of drops and meniscus buildup. The concentration of sodium chloride used helps to attain the conductivity required for optimum performance. The instrument is switched on for 10 minutes to warm up before taking the reading. When the rat paw is dipped in the cell, it displaces a certain volume of solution and this volume (paw volume) is directly displayed on the reading device. The drug is administered orally to the rats and then after one hour a definite volume of carrageenan is injected into the plantar tissue of the right hind paw and immediately the paw volume is recorded. The paw volume is again recorded after one and three hours. The decrease in the paw volume as compared to the paw volume of rat receiving carrageenan only indicates the anti-inflammatory activity.

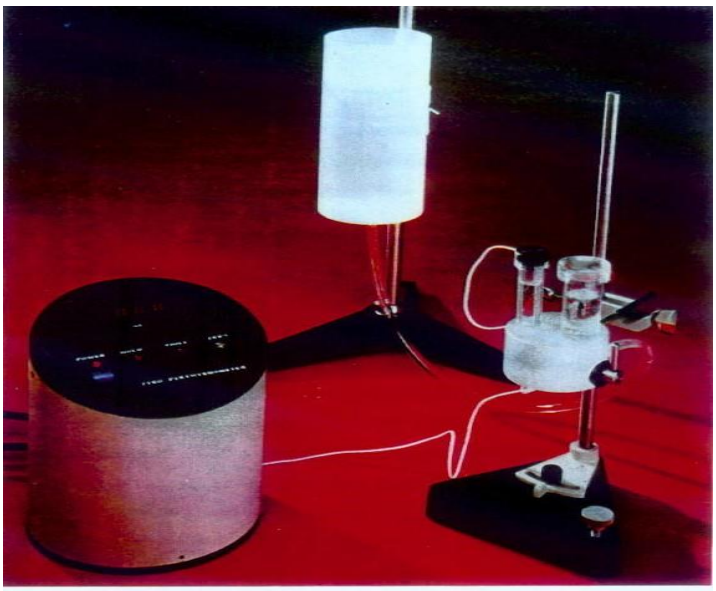

Figure 1 The Plethysmometer

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Mr. Chandrawadan Vishwambhar Panchal
Research Scholar

Dr. Dhanraj R. Jadge
Research Guide